



State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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January 20, 1999

TO: File

THRU: Daron Haddock, Permit Supervisor

FROM: Paul Baker, Reclamation Biologist

RE: Permit Application Package, West Ridge Resources, Inc., West Ridge Mine,
PRO/007/041-98-1, Folder #2, Carbon County, Utah

SUMMARY:

West Ridge Resources, Inc., has submitted a permit application package to mine in the area southwest of West Ridge and north of East Carbon. Surface facilities would be mostly in C Canyon, but the applicant is also proposing a potential topsoil borrow site about one mile from the surface facilities.

The application includes an experimental practice proposal to bury, rather than salvage, topsoil in part of the proposed disturbed area. Other issues include the presence of relatively large amounts of canyon sweetvetch, a sensitive species, and the proximity to three golden eagle nests.

TECHNICAL ANALYSIS:

ADMINISTRATIVE INFORMATION

IDENTIFICATION OF INTERESTS

Regulatory Reference: R645-301-112

Analysis:

West Ridge Resources, Inc., has applied for a permit to mine in an area north of East Carbon in Carbon County. The applicant is a corporation existing under the laws of Delaware and qualified to do business in Utah. The application shows the applicant's address, telephone number, employer identification number, and resident agent. The applicant will pay the abandoned mine reclamation fee.

The applicant is owned jointly by the Intermountain Power Agency (IPA) and by Andalex Resources, Inc. Names, addresses, and employer identification numbers of persons that own or control the applicant are in Section 112.300 and Appendix 1-7. Appendix 1-5 lists affiliated coal mining and reclamation operations and these operations' permit and MSHA numbers (where MSHA numbers are available) together with dates of issuance. This information will need to be checked through the applicant violator system.

In Section 112.500, the application lists surface and subsurface owners in the proposed permit area. Map 5-2 shows surface land ownership in the area, and Map 5-3 shows subsurface ownership. Surface owners in the proposed permit area are the Bureau of Land Management (BLM), the State School and Institutional Trust Lands Administration (SITLA), and Penta Creek, LLC. The BLM and SITLA are subsurface owners. The BLM, SITLA, and Penta Creek own contiguous property, both surface and subsurface.

MSHA numbers have not yet been issued, and they need to be included in the application as soon as they are available.

West Ridge Resources has applied for a lease by application in an area north and west of the proposed permit area. They have also obtained an option to acquire mining rights for adjacent State coal reserves.

Findings:

Information provided in the application is not considered adequate to meet the requirements of this section of the regulations. The applicant must provide the following in accordance with:

R645-301-112.700, MSHA numbers need to be included in the application as soon as they become available.

VIOLATION INFORMATION

Regulatory Reference: R645-301-113

Analysis:

Neither the applicant nor any subsidiary, affiliate, or any persons controlled by or under common control with the applicant has had a federal or state coal mining and reclamation permit suspended or revoked in the past five years, nor have they forfeited any performance bond or similar security.

Appendix 1-2 has a list of violations received by the applicant and associated entities

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within the three year period before the application date. MSHA numbers are not listed with the violations but can be found in Appendix 1-5.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

RIGHT OF ENTRY INFORMATION

Regulatory Reference: R645-301-114

Analysis:

The applicant holds federal coal lease SL-068754 and bases its right to enter most of the proposed permit area on language in the lease. This lease was modified on September 1, 1998, to include the, SE¼ SE¼ of Sect. 10 and the NE¼ NE¼ of Sect. 15, Township 14 South, Range 13 East.

The proposed topsoil borrow site is on land administered by SITLA, and Appendix 1-10 of the application includes a copy of the special use lease agreement with SITLA.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

UNSUITABILITY CLAIMS

Regulatory Reference: R645-301-115

Analysis:

The application says the proposed permit area is not within an area designated as unsuitable for mining, and West Ridge Resources is not aware of any petitions to designate the area as unsuitable for coal mining and reclamation activities.

The operations will not be conducted within 100 feet of an occupied dwelling, and the application contains a copy of letter from Carbon County granting permission to conduct mining and reclamation operations within 100 feet of the proposed C Canyon road. The letter includes certain stipulations:

1. Andalex (West Ridge Resources) should avoid any negative impacts to the road and should place a sign on the road indicating that a controlled access area lies beyond.
2. Ingress and egress from the county road to the mine facilities should be designed and constructed to provide maximum safety to public users of the road.
3. All mining operations adjacent to the road should be conducted in a manner that assures safety to the public.
4. Andalex (West Ridge Resources) will be responsible for maintenance of the portion of the road within the disturbed area.
5. Carbon County requires that Andalex (West Ridge Resources) leave the road in place and intact upon final reclamation and terminate the road at a parking/turnaround area for public use.

The public notice advertising that an administratively complete plan was available indicated the mine would be within 100 feet of a public road. This is in compliance with the requirements of R645-300-121.150.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

**PERMIT TERM, INSURANCE, PROOF OF PUBLICATION,
FACILITIES OR STRUCTURES USED IN COMMON, FILING FEE,
NOTARIZED SIGNATURE**

Regulatory Reference: R645-301-116, -117, -118, and -120

Analysis:

The application contains a general schedule for mining operations. The schedule shows construction beginning in April 1999 with mining starting in January 2000.

The term of the permit would be for five years.

Appendix 1-1, Attachment 1-1 contains a certificate of liability insurance that meets the requirements of the State Program.

Proof of publication and a copy of the newspaper advertisement are in Attachments 1-3 and 1-2 in Appendix 1-1.

There are no facilities or structures that would be in common with any other coal mining and reclamation operation.

A copy of the \$5.00 check for the filing fee is in the application, and the application also contains a statement with the notarized signature of Samuel Quigley that the information in the application is true and correct to the best of his information and belief.

For this portion of the technical analysis, the application was not reviewed for compliance with other aspects of the cited rules.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

ENVIRONMENTAL RESOURCE INFORMATION

LAND USE RESOURCE INFORMATION

Regulatory Reference: R645-301-411

Analysis:

According to the application, land uses in the proposed permit area have included grazing, wildlife habitat, coal mining, and recreational activities. Use of the land is limited largely by topography. There is an elevation change of about 2000 feet from the lowest to the highest parts of the proposed permit area. Steep-walled canyons, cliffs, and numerous large rocks on the slopes make other uses very difficult to impossible.

All but a small portion of the proposed permit area is in the Grassy Trail and Bear Canyon grazing allotments. The locations of these and other nearby allotments are shown on Map 4-1. The Bear Canyon and Grassy Trail allotments produce a total of 150 animal unit months of forage. In 1985, the Soil Conservation Service estimated production in the proposed disturbed area as 300 pounds per acre, but more recent estimates are in Chapter 3.

The area is zoned by Carbon County for mining and grazing use, and West Ridge Resources has obtained a conditional use permit from the county.

According to the application, previous mining consists of exploration activities in the

proposed disturbed area where a total of less than one ton of coal was removed from the Lower Sunnyside Seam. In addition, Kaiser Coal mined a two entry exploration section northeastward into the center of the lease in 1959 and 1960. A section was developed from the main entry, and this section broke out into B Canyon. The breakout was used as an air intake until it was sealed in 1991.

Findings:

Information in the application is considered adequate to meet the requirements of this section of the regulations.

HISTORIC AND ARCHAEOLOGICAL RESOURCE INFORMATION

Regulatory Reference: R645-301-411.140

Analysis:

There have been several archaeological studies done in the area including an intensive study done for this project in the area that would be disturbed by the mine. Other than the areas proposed to be disturbed, only a few relatively small areas have been surveyed within the proposed permit area.

No archaeological sites have been found within the proposed permit area. Eight sites are in nearby areas as shown on Map 4-2. One of these is a group of ruins north of Grassy Trail Reservoir, and the archaeological report says it should be considered eligible for listing in the National Register of Historic Places pending further research. None of the other sites is considered eligible. They consist of lithic scatters, old log cabins, and a trash dump.

Appendix 4-2 contains two letters from the Division of State History, one to the Bureau of Land Management and one to the State School and Institutional Trust Lands Administration. Both letters recommend a determination of no historic properties. Based on the information in the application, the Division should determine the mine will have no effect on archaeological resources.

The proposed permit area includes no cemeteries, trails in the National Trails System, rivers in the Wild and Scenic Rivers System, or public parks.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

VEGETATION RESOURCE INFORMATION

Regulatory Reference: R645-301-321

Analysis:

Vegetation information is in Chapter 3, Section R645-301-321; Appendices 3-1, 3-1A, 3-5 and 3-8; and Maps 3-1, 3-2, and 3-3. A study of nonvascular plants in the Douglas fir/Rocky Mountain juniper area is in Appendix 3-8. Appendix 3-1 has a detailed vegetation study of the proposed mine site, and a study of the potential topsoil borrow area is in Appendix 3-5. Appendix 3-1A is a study of a proposed reference area in the Douglas fir/maple community. Plant communities that could be affected by the proposed mine include pinyon/juniper, Douglas fir/maple, and Douglas fir/Rocky Mountain juniper. Sagebrush/grass and pinyon/juniper communities would be disturbed if the topsoil borrow area is used.

With the methods used for the vegetation studies, percentages of vegetative cover from both understory and overstory combined with litter, bare ground, and rock add to 100%. This method makes comparison of the reference and proposed disturbed areas much simpler than if the overstory and understory were kept separate.

The pinyon juniper community is mostly on the northwest side of the canyon and on both sides of the left fork. Most of the area sampled as "proposed disturbed" is not actually in the area proposed to be disturbed. Because of the rugged topography, it was very difficult to place the sampling points within the proposed disturbed area.

In the pinyon/juniper community, total cover was greater in the reference area than in the proposed disturbed area (52.83% compared to 47.93%), but the difference was not statistically significant. The report says woody plant density values were the same for the two areas although it does not give enough information for the Division to evaluate this statement. Production in both areas was estimated by the Natural Resources Conservation Service as 750 pounds per acre, and the range conditions were both rated as good. Adequate samples of vegetative cover were taken for both areas.

Because of differences in topography and elevation, there are greater differences between the pinyon/juniper reference area and the proposed disturbed pinyon/juniper area at the topsoil borrow area. The reference area is in C Canyon, but the potential topsoil borrow area is on a relatively level bench outside the canyon. However, according to the Division's calculations, vegetative cover in these two areas is only slightly different statistically, and since the reference area has more cover than the proposed disturbed area, there should be no concerns about having too low of a standard. There are some differences in species composition, but these can be accounted for in setting diversity and other success standards.

Cover values were not statistically different between the proposed disturbed and reference

areas for the Douglas fir/maple community. Production was slightly greater in the proposed reference area (1400 lbs. per acre) compared to the proposed disturbed area (1300 lbs. per acre), and the range condition of the proposed disturbed area was only rated as fair while the range condition of the reference area was shown as good. The reference area had a greater number of species, and the proposed disturbed area had dogbane (*Apocynum cannabinum*), a species that indicates past disturbance. Canyon sweetvetch (*Hedysarum occidentale* var. *canone*) was encountered in the proposed disturbed area but not the reference area.

Species compositions in the proposed disturbed Douglas fir/Rocky Mountain juniper area and its corresponding reference area are very similar. Using a standard t-test on unaltered data, the Division found a statistical difference in vegetative cover between the reference and proposed disturbed areas, but the applicant's consultant did not. This is because the consultant used a 95% confidence interval, but the Division used a 90% confidence interval. The proposed disturbed area had 75.75% vegetative cover where the reference area had 66.00% cover. The primary difference was that the proposed disturbed area had more cover from Douglas fir than the reference area. Production in both areas was the same, and both were in good range condition.

There were no statistical differences found between the proposed disturbed and the reference area for sagebrush/grass at the potential topsoil borrow area. The proposed disturbed area was in good range condition where the reference area was in fair condition. Both areas were estimated to have 800 pounds of annual production. Some species in both areas are not desirable, but they do not constitute a major part of the cover.

In addition to the detailed studies of the proposed disturbed areas, the application includes a map showing vegetation communities in the entire permit area. Also, the applicant has committed to take aerial infrared photographs every five years to monitor the effects of underground mining on vegetation.

Although cryptogams are not vascular plants, and some are not even plants, they can be an important component of the ecosystem. However, establishment of cryptogams is not required as a revegetation success standard, and the Division does not normally require cryptogam cover information. Because cryptogams probably contribute to the success of other species, it is conceivable that it would be necessary to establish cryptogams to promote the growth of vascular species to the levels of the success standards. This is not anticipated.

Appendix 3-8 shows cover from cryptogams in the proposed disturbed and reference area for the Douglas fir/Rocky Mountain juniper community.

Findings:

Information provided in the proposal is considered adequate to meet the requirements of this section of the regulations.

FISH AND WILDLIFE RESOURCE INFORMATION

Regulatory Reference: R645-301-322

Analysis:

Wildlife Information

Appendix 3-3 has a list of wildlife species potentially occurring in the proposed permit area. Maps 3-4A, B, C, and D show information about raptor nests and deer, elk and antelope habitat.

There are several golden eagle, falcon, and buteo nests in and near the proposed permit area. Six eagle nests have been found in C Canyon, and there are several other raptor nests in and near the proposed permit area. A peregrine falcon nesting territory has been found near the Centennial Project area, but it is more than ten miles from the proposed permit area.

The proposed mine site includes high value deer and elk winter habitat. The potential topsoil borrow area contains critical deer winter range, and much of the proposed permit area, not including the area that would be disturbed by surface operations, contains critical deer summer range. No pronghorn habitat is shown as being in the proposed permit area.

There is a small number of resident elk and a moderate number of wintering elk in the general area of C Canyon. This area has a high potential carrying capacity for wintering elk, however, it is currently at the population objective according to the Division of Wildlife Resources.

About 360 species potentially exist in and near the proposed permit area, and the application includes relatively general information about several of these species. The only wildlife information gathered for the purpose of the application is the raptor nesting information.

It is unlikely there are significant populations of bats in the area because there is no perennial source of water. Few cliffs will be affected by construction, and it is nearly impossible to survey for bats that roost in trees. In addition, the site does not contain habitat for species that have large, concentrated populations. Therefore, even if there are bats in the area, which is unlikely, they would be very difficult to find and only a few would potentially be lost. For these reasons, information about bats is not required.

The area contains habitat for passerine birds, but there are no sensitive species known to nest in the proposed disturbed area. Even so, nearly all birds are protected. The applicant intends to begin construction in April 1999, and this is prior to when these birds nest. Therefore, there should not be any effects on nesting birds. If construction begins after April, however, nest survey information and a protection or mitigation plan may be required.

The application says there are no perennial streams, wetlands, or riparian areas within the proposed permit area. For this reason, the value for wildlife is restricted, and there are no amphibians or fish that are likely to be affected. While snakes inhabit the area, there is no known critical habitat.

Threatened or Endangered Species

The application contains a letter from the Fish and Wildlife Service identifying eight listed and candidate threatened or endangered species that could occur in Carbon County. It also quotes a letter from the Fish and Wildlife Service written for the West Ridge Project Environmental Analysis. According to the application, this letter says no federally-listed species are known to occur in the project area.

The only species likely to occur in the permit area are the bald eagle and peregrine falcon. There are only four known bald eagle nests in Utah, and the closest is near Castle Dale. Most bald eagles in Utah spend the winter but do not breed here.

As discussed above, a peregrine falcon nesting territory has been found in the Book Cliffs more than ten miles from the proposed mine site, but no nests were found in the raptor survey. Assuming the application is approved, the applicant will need to conduct further surveys to look for nesting activity of all raptors, including peregrines. If found, protection or mitigation plans would need to be developed.

Although there are no fish in the proposed permit area, the mine has a potential, through water depletion, of adversely affecting threatened or endangered fish of the Upper Colorado River. This issue is addressed as part of the fish and wildlife protection plan.

The letter from the Fish and Wildlife Service includes Graham beardtongue (*Penstemon grahamii*) as a candidate species that occurs in Carbon County. According to Ben Franklin of the Utah Natural Heritage Program, there is a historical collection of this species in the extreme northeastern corner of the county a few hundred feet from the county line. It is an endemic that occurs almost exclusively on the Green River formation in Uintah and Duchesne counties. There is virtually no likelihood the mine would affect this species.

Canyon sweetvetch is no longer a candidate threatened or endangered plant species, but it is on the Bureau of Land Management's list of sensitive species. It is relatively common in the area of the proposed mine as documented in the vegetation studies.

The application says the burrowing owl is not expected to be found within the permit area as they use prairie dog burrows as nest sites; however, the Fish and Wildlife Service commented that they also use badger and marmot burrows for their nest sites. It is not anticipated, though, that the proposed permit area contains suitable habitat.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

The applicant intends to begin construction in April 1999, and this is before passerine birds are likely to be nesting. If construction begins later in the season, a bird survey together with a protection or mitigation plan may be required.

OPERATION PLAN

AIR QUALITY

Regulatory Reference: R645-301-420

Analysis:

The application is required to show the coordination that has been undertaken with the Division of Air Quality to comply with the requirements of the Clean Air Act. Appendix 4-5 includes a copy of the Intent to Approve New Coal Mine in C Canyon from the Division of Air Quality. When the actual approval order is received, it will need to be included in the application.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations. However, the application will need to be updated as the Air Quality Approval Order is issued.

INTERIM STABILIZATION

Regulatory Reference: R645-301-331

Analysis:

The plan for interim revegetation is to seed the mixture shown in Table 3-3 in late fall or early spring on topsoil stockpiles and regraded slopes. Among the areas that would be seeded are the outslope of the sediment pond, fill slopes, and side slopes.

Alfalfa is the only introduced species in this seed mixture, and it is not expected to spread inordinately or to dominate the other vegetation. The species in this mixture should provide

good erosion protection.

In areas where the interim seed mixture will be used, the soil surface will first be roughened or gouged. Fertilizer would be applied if necessary and the area seeded in late fall or early spring. The interim seed mixture will be hand broadcast and the areas raked to cover the seed. Straw mulch would then be spread with a mulch and tackifier applied over the straw in larger areas such as the topsoil stockpile.

Canyon sweetvetch is included in the seed mix for both interim and final reclamation. The seeding rate will depend on future field tests and seed availability. It will be planted on topsoil piles both for interim revegetation and to propagate seed for final reclamation. Areas planted with this seed will need to be monitored closely.

This rule requires the applicant to minimize disturbance. As far as possible the applicant needs to avoid using the topsoil borrow area.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section of the regulations.

FISH AND WILDLIFE RESOURCE PROTECTION

Regulatory Reference: R645-301-333

Analysis:

Power lines will be designed and installed using raptor-proof designs. Hunting platforms could be installed on select poles.

Areas in the proposed permit area containing potential raptor nesting habitat will be surveyed in the field within one year of any mining activity that could result in subsidence. Should any nests be found, the applicant would consult with the Division, the Division of Wildlife Resources, and the Fish and Wildlife Service.

Surface water quality will be protected using sedimentation controls. The sediment ponds will be monitored for any adverse effects on wildlife, and these effects would be reported to the Division of Wildlife Resources. Should mining disrupt a seep or spring that was utilized by cattle or wildlife, the applicant would replace the quantity of water depleted from that source at a similar location unless the seep is restored naturally in a nearby area.

As mentioned above, there are six golden eagle nests in C Canyon near the proposed

mine. Five are in the right fork, but the mine site is not visible from them. In addition, the closest part of the mine surface facilities to the nests is the topsoil pile where there should be little activity. Therefore, a buffer zone was established in the vicinity of these nests where no surface mining activities should occur.

Wildlife Resources did not consider blasting when it established the buffer zones, and blasting may be necessary during construction of the mine. According to the application, it is unlikely blasting will be needed. There are two areas where it might be necessary if bedrock is encountered, but even if these areas have bedrock, it would probably be possible to use hydraulic pick hammers mounted on trackhoes. If the applicant must blast, it would be limited to daylight hours. The nests are about 4000 feet away and screened by both the canyon walls and vegetation. Considering these factors, blasting can be allowed but should be avoided if possible.

In the left fork of the canyon is a nest that was inactive in 1981, 1997 and 1998, and much of the proposed minesite is within one-half mile of this nest. The application says this nest would be considered abandoned under Bureau of Land Management guidelines and that no take permit is necessary. In a letter dated October 15, 1998, the Division of Wildlife Resources concurred with this assessment.

As mining begins, the applicant would need to continue to monitor the nests in the area and may need to obtain take permits. It may also be necessary to preclude birds from nesting in particular places because of the potential of losing the nests through cliff spalling or other results of subsidence. At other mines, chain link fencing material has been put over nests to keep birds away during the time when subsidence was anticipated.

Through water use, the mine has the potential of adversely affecting four threatened and endangered fish species of the Upper Colorado River. In Appendix 7-7, the application includes estimates of how much water will be used, and it is less than one hundred acre feet per year. Above one hundred acre feet per year, the Fish and Wildlife Service would require a mitigation fee. A final determination of effect will need to be made by the Office of Surface Mining, Reclamation and Enforcement in consultation with the Fish and Wildlife Service.

The site for potential topsoil borrow is in critical deer winter range, and the applicant has committed to perform mitigation work if the site is ever used. Because the site may not be disturbed, it is not necessary to perform the mitigation or pay for it at this time.

The Division requires enhancement or avoidance for areas of critical habitat, but it is understood the Bureau of Land Management requires mitigation for areas of high priority habitat as well. The mine site is in high priority habitat.

Some of the greatest effects on wildlife will be from the road. While the Division will not have jurisdiction over most of the road, drivers need to be instructed on the importance of maintaining a proper speed through the area and of removing any big game animals killed as far

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as possible from the road. Killed animals should also be reported to the Division of Wildlife Resources. By removing these carcasses or keeping them as far away from the road as possible, the risk of collisions with eagles, other raptors, and vultures can be reduced.

The applicant has committed to conduct wildlife education session for its and its contractors' employees. Many conflicts with wildlife can be avoided through knowing what actions may be detrimental or beneficial.

Findings:

Information provided in the proposal is considered adequate to meet the requirements of this section of the regulations.

RECLAMATION PLAN

LAND USE RECLAMATION PLAN

Regulatory Reference: R645-301-412

Analysis:

The applicant proposes no changes to the existing land uses. The application includes copies of comments from the Bureau of Land Management and the School and Institutional Trust Lands Administration supporting the proposed and current land uses.

Carbon County requires that the access road be left following mining, including that portion in the proposed permit area. In a letter dated August 14, 1998, the Bureau of Land Management said it acknowledges the road will be retained and finds this acceptable.

Findings:

Information provided in the application is considered adequate to meet the requirements of this section.

REVEGETATION

Regulatory Reference: R645-301-341

Analysis:

Revegetation Plan

The revegetation plan is primarily in Section R645-301-341. Three revegetation scenarios are shown, one for areas where topsoil would be salvaged and redistributed, one for areas with topsoil that is covered with a geotextile, and one for rock/rubbleland areas. In the rock/rubbleland areas, there are a few areas where topsoil would be salvaged and later replaced.

Once the site is prepared by grading and replacing topsoil, removing fill (rock/rubbleland), or removing fill and the geotextile (experimental practice area), the same revegetation techniques will be used for the entire area. This sequence is:

1. A weed-free alfalfa hay mulch would be applied at the rate of 2000 pounds per acre, and fertilizer would be added if deemed necessary.
2. The surface will be gouged. In this process, the alfalfa and fertilizer will be mixed into the soil and the soil will be roughened.
3. The seed mix will be broadcast seeded or hydroseeded.
4. The area will be mulched with 2000 pounds per acre of straw, and a wood fiber mulch and tackifier will be applied.

Seeding will be done as soon after regrading as possible but prior to the end of October. According to the timetable in Table 5-1, some seeding could occur as early as June. Seeding this early should be avoided as much as possible, but it is more important to seed before the soil has a chance to crust than to wait until later in the year. As experience is gained at other nearby mine sites, it may become necessary to change the seeding schedule.

The applicant has committed to place large rocks on regraded areas to increase landscape diversity. In addition to making the site look more natural, these will serve as wildlife habitat and provide a greater diversity of sites for different plant species. They create localized areas of concentrated runoff and cooler temperatures where species can become established that would not survive if the site was uniform.

The seed mixes to be used in final reclamation are in Tables 3-2A, B, C, and D. No introduced species are included in these mixtures, and winterfat has been added at the suggestion of the Division of Wildlife Resources.

The applicant has included several species encountered in vegetation sampling that should increase vegetation diversity of the revegetated areas. Seed of all these species is available commercially, but some must be hand-collected.

The applicant has collected seed of canyon sweetvetch and will plant most of this seed on the topsoil pile(s) for the purpose of propagating seed that can be used for final reclamation. Some seed will not be planted in case the initial revegetation efforts fail. Canyon sweetvetch grows well on disturbed sites, and it should grow well in reclaimed areas.

Douglas fir would be planted in Douglas fir/Rocky Mountain juniper areas both from seed and transplants. Since Douglas fir is a common tree grown for timber, it is likely that plants inoculated with ectomycorrhizae are available commercially, and the applicant has committed to attempt to use inoculated plants.

Studies have documented that populations of microorganisms in stockpiled soil decrease with time and depth in the stockpile. At the West Ridge Mine, soil that is stockpiled or under fill is likely to have very few living microorganisms when the mine is reclaimed. In addition, cover from cryptogams, including liverworts, mosses, lichens, and cyanobacteria, will be destroyed.

Most perennial plants form symbiotic relationships with various species of fungi that allow the plants to take up more water and nutrients from the soil. This allows them to better compete with non-mycorrhizal species, especially weeds. Moreover, there is evidence that cryptogams decrease soil erosion and increase the amounts of some nutrients in the soil.

Cryptogams have not traditionally been considered "vegetation" that is required for bond release; however, they may be important for other reasons. Soil inoculation to try to establish cryptogams and vesicular arbuscular mycorrhizae has been tried in a few areas, but there has been little work on coal mines in Utah. Because the efficacy of inoculation is not known, the applicant has not proposed it as a technique to be used in final reclamation but has proposed to use a commercially available soil activator in the test plots. Test plot results will be used to modify the mining and reclamation plan. If the soil activation or other techniques used in the test plots are not as successful as needed, it would be possible to attempt to culture microorganisms in a greenhouse. The Division is unaware of instances where this has been tried on a large scale, so this method is not being required at this time.

The applicant does not intend to irrigate but, instead, will use water harvesting methods. Irrigation should not be necessary at this site.

Pesticides will only be used if a problem is identified and spraying is deemed necessary to control damage to reclamation. The area does not have heavy infestations of noxious weeds, so it is not anticipated herbicides will be needed. The use of other pesticides would depend on what problems are encountered, but none are foreseen.

In Sections 341.300 and 342.100, the application indicates native species have become reestablished in disturbed areas without seed or mulch application or surface preparation. While the Division does not know precisely what reclamation efforts have been undertaken in this area, there are stands of introduced grasses that have the appearance of having been seeded. Nearby sites with less precipitation, such as Horse Canyon, have had good revegetation success.

The mine site poses certain challenges for reclamation, but considering the soils, climate, the revegetation plan, and other factors, the Division considers the probability of reclamation success to be high. The application includes revegetation techniques that have been tried and proven successful at area mines with similar conditions.

When reclamation begins in the experimental practice area, it is expected that soil will be compacted and essentially devoid of microbial activity. Adding alfalfa hay and gouging should adequately alleviate the compaction.

The proposed disturbed area is relatively narrow with sources of soil organisms that could colonize the nearby disturbed area. Division representatives have seen cryptogamic soil crusts beginning to form in a topsoil borrow area not far from the proposed West Ridge Mine after only eight years. Therefore, it is expected that inoculation will occur naturally. However, the applicant has committed to modify the plan to include a soil activation or inoculation method in the reclamation plan if the test plot results indicate it is needed. Considering these factors, it appears likely microorganisms will be reestablished quickly and that vascular plants can then benefit from them.

Revegetation Success Standards

As discussed in the vegetation information section, there are few differences between the reference areas and the proposed disturbed areas. Using untransformed data, the only significant difference where the proposed reference area has less cover than the proposed disturbed area is in the Rocky Mountain juniper/Douglas fir community. The vegetative cover values were statistically different at 90% but not at 95% confidence. Constructing a 90% confidence interval allows 66.53% cover, and the actual value is 66.00%. However, if one performs a natural logarithm transformation of the data, there is no statistical difference.

Every other aspect of the proposed reference and disturbed areas in the Rocky Mountain juniper/Douglas fir community is the same or very similar, including species composition, aspect, slope, soils, productivity, and range condition. Because of the many similarities, the Division feels the proposed reference area is an acceptable standard.

The Douglas fir/maple reference area is shown on Map 3-1, and quantitative information is included in Appendix 3-1A. Woody plant density and vegetative cover are not statistically different in the proposed reference and disturbed areas; however, the proposed reference area appears to have greater diversity. While achieving this standard may present difficulties, it

should be possible to attain the standard using the reclamation plan the applicant has proposed.

The sage/grass and pinyon/juniper proposed disturbed and reference areas are, for the most part, very similar. As discussed in the Vegetation Resource Information section of this review, the proposed pinyon/juniper reference area has greater cover than the proposed disturbed pinyon/juniper community in the potential borrow area; however, because the standard is higher than what currently exists at the site, the application is more stringent than the regulations.

Diversity will be measured using MacArthur's diversity index. The application gives a brief discussion of this index, and it is an acceptable means of measuring diversity. The standard would be that the index for disturbed areas would need to be at least 90% of the index for the reclaimed area. This is a satisfactory standard, but at the time of final reclamation, the Division and the applicant may find it difficult to achieve and too inflexible. If the applicant is unable to meet this standard during final reclamation, the Division should examine current rules and decide if a different standard would be more applicable based on both current conditions at the time and the baseline information.

Erosion control would be judged using the "Erosion Condition Classification System" originally developed by the Bureau of Land Management and modified by the Office of Surface Mining. Reclamation would be considered successful if soil surface factor values were the same as or lower in the reclaimed areas as in adjacent undisturbed areas.

With the exception of one succulent and one stonecrop species, it appears all species encountered in vegetation sampling are cool season. The two CAM species are relatively insignificant and are not desirable; therefore, the only standard needed for seasonality is that all plants would be cool season. This should be easy to achieve since the warm season plants are normally more difficult to establish.

For areas with a postmining land use of wildlife habitat, the Division is required to consult with State wildlife agencies and gain approval for tree and shrub establishment success standards. The Division has consulted with the Division of Wildlife Resources and developed standards, and these have been included in the application. The standards are based primarily on existing conditions and take into account the species that contribute to the woody plant densities in the various areas. In the sagebrush/grass area, the numbers of woody plants in both the proposed disturbed and reference areas are considered excessive, so the standard is lower than the number currently existing at the site. The established standards are included in the application.

Table 3-4 of the application is a revegetation monitoring schedule. Qualitative observations would be done every year after seeding, but quantitative observations would be done only in the years specified. The monitoring schedule is considered adequate.

Field Trials

Section 341.300 has a brief description of the plan for test plots, but a more detailed description is in Section 231.300. The test plots will be established on the topsoil pile in the right fork. During construction of the topsoil pile, geotextile will be placed in the area where one of the test plots will be. Enough material will be placed over the geotextiled area to simulate the amount of fill that will be on the experimental practice area. After about five years, soil over the geotextile will be removed and placed in a 12-18 inch layer on another part of the topsoil pile. The purpose of these treatments is to compare traditional topsoil salvage and replacement techniques with the experimental practice.

One portion of the test plot area will be treated with a commercially available soil activator designed for revitalizing soil. This will be done to determine if this method promotes faster establishment or greater diversity. Although this is not currently being proposed in the final reclamation plan, it could be used if the test plots indicate it is a beneficial treatment. The test plots will then be seeded and mulched as shown in the plan for final revegetation. This will include seeding with canyon sweetvetch.

Monitoring will proceed for five years or until a determination of success has been made and will compare the test plots with each other and with the Douglas fir/maple reference area. If the results show a need to revise the revegetation plan, the applicant will work with the Division to amend the plan and incorporate needed changes.

Table 3-4 shows a monitoring schedule that includes quantitative observations over the five-year period. Using cover measurements, it will be possible to compare vegetation diversity in the different areas. This schedule is considered adequate.

Wildlife Habitat

Plant species in the seed and planting mixtures were selected on the basis of forage nutrition and cover values and adaptability to the environment. While the species in the seed mixtures are not all identical to those currently existing on the site, they are similar and should enhance the value of vegetation for wildlife. Rocks to be used in reclamation will also create wildlife habitat although it will not be to the degree that currently exists on the site.

Appendix 3-6 contains comments from the Division of Wildlife Resources about the application. The comments primarily concern updating basic wildlife information, but there is also a suggestion to add winterfat to the seed mixture. The comments have been addressed, and, based on conversations with Wildlife Resources personnel, it does not appear additional enhancement measures will be needed. Wildlife Resources personnel have indicated they are pleased with the seed mixtures.

The applicant intends to do off-site mitigation in the form of either shrub plantings or

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installation of a guzzler. According to the application, Wildlife Resources and the BLM are supportive of these options, and the applicant is working with these two agencies on plans for the mitigation. An outline of mitigation measures will need to be included in the application when they are finalized.

Findings:

Information provided in the proposal is considered adequate to meet the requirements of this section of the regulations.

RECOMMENDATIONS:

The applicant needs to include MSHA numbers and the Air Quality Approval Order when they become available. The reviewed sections of the application can be approved, but the applicant could not begin construction without approval from the Division of Air Quality and could not construct anything requiring MSHA numbers before they are issued.